

GENERAL SAMPLING STOCKPILE MATERIAL

Part 4**Sampling Methods**7-18 SCOPE.

- a. This part prescribes sampling methods to be followed by DNSC Specialists and by contractors performing services for DNSC.
- b. The methods are based upon recognized and accepted industrial practices and must be applied as standards in the sampling of commodities listed herein. These methods are general in scope since they must be adaptable to varying conditions encountered in sampling operations.
- c. Specific sampling and analysis procedures that are stated in inspection and sampling plans prepared by DNSC or stated in purchase, disposal, sampler/analyst, and analysis contracts shall always have priority to the general sampling plans listed below.

7-19 SAMPLING METHOD NO. 1.

This method is applicable to free flowing powders, granules, small crystals, and other finely divided materials that tend to segregate or stratify by gravity into layers of different compositions. It covers material received in boxes, bags, barrels, drums, and other containers too large to be sent to the laboratory.

a. Apparatus. The apparatus, called a sample trier or thief, to be used on materials in this category consists essentially of two slotted tubes, one of which fits within the other. It can be taken apart readily and cleaned by brushing. The original Minnesota State grain trier or the Grain Sampler recommended by the Association of Official Agricultural Chemists (AOAC) can be used.

b. Gross sample.

(1) For commodities received in containers other than bags, 10 percent of the containers in any shipment or inspection lot must be opened for inspection and sampling. The percentage of containers sampled may be increased if the Specialist determines that the character of the material requires additional sampling.

(2) For commodities received in bags, the rates of sampling will be as follows:

(a) For lots containing 10 tons net or less, a sample will be taken from 10 percent of the bags, or from 20 bags, whichever is the greater number.

(b) For lots ranging in size from 10 tons to 100 tons, samples

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will be taken from 20 bags, plus one additional bag for each additional ton of material in excess of the first 100 tons.

(c) For lots exceeding 100 tons net, samples shall be drawn from 100 containers, plus one additional container for each additional 2 tons of material in excess of the first 100 tons.

(d) The sampling procedure described in (a), (b), and (c), above, applies to material in bags having a net content of approximately 100 pounds or less. For greater net weights, the number of containers sampled may be reduced in proportion to the percentage of increase in weight over 100 pounds net per container. Containers to be sampled must be selected at random, as nearly as possible, from different parts of the lot. The actual sampling operations will differ according to containers and a condition under which sampling is accomplished. But a cross section of the material sampled must be obtained from the top to bottom of the containers, to eliminate poor representation due to settling or stratification of mixtures or powders of different degrees of fineness or specific gravity. Therefore, the special tier described above should be inserted from either end of the container through to the opposite end and, if possible, diagonally.

(3) The accumulated samples from 10 percent of bags or other containers in a 1,000-unit lot will amount to about 20 pounds. The total sample taken from one lot will be thoroughly mixed and then riffled down through an approved riffler to an amount that will provide the required number of samples.

c. Laboratory sample. Three samples are normally required, one for the seller, and two for the Government, one of which is called the umpire. If the vendor desires more than one sample, it must be prepared along with the others. After riffling the composite sample down to at least the minimum amount required for the final samples. The material is again thoroughly mixed and placed on a large sheet of heavy wrapping paper or plastic sheeting, spread out in a layer about 1 inch thick on the mixing surface by coning and flattening, and then divided into the required number of portions. Disposition of samples collected from each lot shall be as directed in par. 9-6.

7-20 SAMPLING METHOD NO. 2.

This method of sampling is applicable to solids of known uniform chemical composition, such as sebacic acid, quebracho, or similar loose solids in the form of lumps, flakes, crystals, cubes, sheets, powder, etc. of uniform chemical composition and contained in ships' holds, railroad cars, bags, drums, barrels, boxes, or other containers.

a. Apparatus. A trier or thief (so-called butter trier) measuring 14 inches overall length, with a half-cylinder stainless steel blade approximately 13 inches long with greatest diameter eleven-sixteenths of an inch near the handle and tapering uniformly to nine-sixteenths of an inch near the rounded, sharp digging end, may be

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used. This trier is used in the case of material in barrels, by first boring 1-inch holes through top or side of the barrel, inserting the trier, removing a portion for sample, and closing the hole in the barrel with a cork stopper or wooden plug. The trier may also be pushed through the walls of a jute or cloth bag, a portion of the contents removed, and the hole closed by sewing. Shovels, spoons, and hands may be used, where applicable. Hammers may be necessary to reduce lumps and, in conjunction with chisels, to chip or break solid masses. Jones' samplers will be found convenient in the operation for reducing the gross samples to laboratory size.

b. Gross sample. This method requires judgment (based on the character of the materials being sampled). Lumps should be selected to truly represent the material. It is most important to secure a proper ratio between the larger pieces and the finer powder that is practically always present. Uniformly fine materials present much less difficulty in sampling, but due to various causes, the condition of the outside and surface portions may differ from that of the interior. Therefore, it is always advisable to use a trier. In all cases, the sampler must be satisfied that the sample is typical of the whole and not merely of a portion. If individual containers of the same lot appear to differ in any way, samples of the differing material must also be sent to the laboratory. Material packed in barrels must be sampled by removing the heads and taking three trier samples. One near the center, and one radially on each side of the center halfway between the center and side; or holes may be bored through the side of the barrels, the trier portion removed, and the holes closed with cork stopper or wooden plugs. Bags must be pierced with the 14-inch trier, in places equally distant from each other, portions removed, and holes sewed up. Knitting can close the hole with a sharp pointed instrument. Ten percent of barrels, bags, and similar containers in each lot must be sampled. The gross samples should be equal to 1/10 percent of the lot, but never less than 10 pounds.

c. Laboratory sample. The gross sample, which must be collected in bags or buckets, is transferred to a smooth surface, preferably steel, and the lumps or other large pieces broken up. After crushing, mixing, coning, and quartering, the sample is placed on a clean cloth or paper and rolled. The rolled material is spread out with a spatula and small amounts selected from points all over the spread material so that the final sample will be representative. If the spread material is fine, the portion for the laboratory sample may be selected by means of an approved riffler. Disposition of samples collected from each lot shall be as directed in par. 9-16.

7-21 SAMPLING METHOD NO. 3.

This method covers hand sampling of heterogeneous solids in various forms. It is recommended only where sampling machinery is not available. The sampler, bearing in mind the particular conditions occurring at the place of sampling must work out each problem. The methods will vary depending upon the type of material such as coarse, fine, or mixtures of both, as well as the containers.

a. Apparatus. Short and long-handled shovels; coal forks with suitable rounded points and others with square digging edges. Wheelbarrows; light and heavy

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hammers and mauls; gross sample buckets and bags; spatulas; triers as described in method 2. Pipe samplers 6 to 8 feet long and 2 inches in diameter, having a narrow slot lengthwise starting a foot or more from handle end and ending within a few inches of the opposite, sharpened, circular end; and crushers and grinders.

b. Gross sample.

(1) Mechanical sampling, the most efficient and economical method, must be used whenever possible. This process produces approximately 2 to 3 pounds of sample for each net ton of original solids. At remote stockpile sites, where there already is an analysis of record, the gross sample rate could be set at approximately 1 to 2 pounds per ton - the most important element being the care with which the sample is taken and how representative it is of the material sampled. The sample produced in this manner will pass through an eight-mesh screen. The amount of sample at this stage from 100-ton lot solids would be 320 pounds. This is mixed, coned, and quartered to 50 pounds (the gross sample).

(2) Hand sampling of coarse and fine solids loaded in bulk into railroad cars is to be accomplished from 12 spots in the material in each car. One in each corner of the car near the bottom of the pile, and one in each corner near the top, and four of the material near the bottom of the pile. A total of 50 to 100 pounds of material is to be obtained from each car. When material is sampled in trucks, a similar procedure must be followed, with a proportionate number of spots selected and quantity taken. These samples can be taken with shovel or, if the material is fine or soft, with pipes driven into the material. The sample portions from all of the car or truck loads of material comprising the lot are to be crushed with a crusher, or broken by hammers and mauls if no crusher is available, so that no lumps exceed 2 inches in size. The quantity is then reduced to approximately 200 to 500 pounds, depending on the size of the lot, by mixing, coning, and quartering. When a power crusher is not used a hard, clean surface, free from cracks and protected from rain, snow, wind, and sun, must be used for breaking up lumps. Cinders, sand, chips, or other contaminating material must be avoided. This additional crushing of large lumps may be done with hammers or mauls. The 200 to 500 pounds portion can be crushed in stages to about one-fourth of an inch size, and the material coned and quartered or riffled to about 100 pounds.

(3) Materials in barrels, bags or similar containers must be sampled by removing about 5 pounds from below the surface of every 10th container, with a shovel, trier, or pipe, making sure that the 5-pound sample is representative of the entire contents of the container. If this method is not practicable, every 10th container must be dumped on a clean, hard surface, and by means of shoveling, coning, and quartering, reduced to approximately 5 to 10 pounds in weight. The gross sample thus consists of a combination of these portions. It may be necessary to reduce the size of the particles as outlined above. If this routine cannot be carried out for sampling, representative pieces must be sent to the laboratory as a sample. If

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a belt conveyor is transporting solids, the belt can be stopped every hour, all of the material between two idlers taken, and the belt then swept clean. If equipment exists for cutting the stream as it passes over the end of the belt, samples of the material, in the amount of at least 2 pounds for each ton, must be taken at regular intervals. Whenever possible, bulk shipments must be sampled while being unloaded from or loaded into the carrying vehicle because samples taken in this manner are generally more representative than those taken from loaded material in a car or truck.

(4) Moisture sample. As most ores and concentrates are sold on the equivalent dry-weight basis, it is necessary to determine their moisture content. Because it would be impractical to dry the whole shipment of material before weighing, a sample must be taken as close to the time of weighing as possible. There must be a minimum amount of handling to prevent drying of the sample. If there is only a brief interval between weighing and the loading or unloading of the conveyance, the sample may be taken during this time. Two or more holes must be dug into the material in the truck, rail car, or pile after the surface layer has been scrapped off. The sample thus obtained (approximately 100 to 200 pounds) must be a representative portion of the material, with emphasis on having the proper distribution of fine and coarse particles. These portions must then be placed in a tight container until the gross sample has been accumulated for the lot. If the sampling of a lot of material continues beyond a normal work shift, the material obtained during each work shift must be combined and mixed to form the gross sample. The gross sample for each moisture-lot will be mixed three times, coned and quartered or riffled down for a net sample of approximately 20 to 30 pounds, which must be placed inside a sealed or tied plastic bag that has been inserted in a tight container.

(5) Ferroalloys.

(a) Ferrochromium, Ferromanganese and Silicomanganese. For lump alloy in bulk a representative gross sample from the lot shall be taken at the rate of approximately three pounds per ton. If possible the sample should be taken during loading or unloading operations. For containerized or crushed alloy, one container out of every 10 containers in the lot must be opened and dumped on a clean surface, then sampled at the rate of 1 pound for each 500 to 1,000 pounds in the lot. The samples shall be taken from numerous locations, which assure the obtaining of pieces comprising the gross sample from uniformly distributed points throughout the lot. From each of the large lumps (approximately 5 to 10 inches in size) in the samples selected there shall be broken one piece approximately 3/4 inch to 2 inches in size. These pieces shall be combined with representative amounts of small lumps (2 inches), and fines. It may be necessary to move many surface pieces to sample lumps underneath. After the entire lot has been sampled, the gross sample shall be crushed to 3/4 inch and down, mixed and divided. The gross sample shall be reduced to approximately 25% by splitting two times, then crushing to 1/4 inch and smaller followed by riffing and/or coning and quartering to approximately 2 to 4 lbs.

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Unused remaining portions of the gross sample shall return to the lot.

(b) Ferrovanadium, ferromolybdenum, and ferrotungsten.

These alloys are all high-priced materials. Therefore, it is important that the sample be thoroughly representative, regardless of the amount of material involved. Ten percent of the containers in the lot must be dumped on a clean surface. A shovel scoop can be used to take the portions from the dumped material; and sample, representing 1 to 2 pound for each 1,000 pound in the lots, must be taken. After the entire lot has been sampled, the gross sample shall be crushed, mixed, and divided as stated in (a) above.

c. Laboratory sample. When chemical analyses are to be performed, the 2 to 4 pound sample shall then be alternatively pulverized in a mortar, or suitably designed crusher, and sieved until it all passes a 100-mesh sieve. The minus 100-mesh sample shall be mixed, coned and quartered or divided in a suitable manner into the required number of equal portions. If the approximately 2 to 4 pound sample can not be pulverized to minus 100-mesh, the sample shall be mixed, coned and quartered or divided in a suitable manner into the required number of equal portions. Unused remaining portions of the final sample shall not be returned to the lot but disposed of in the proper manner.

7-22 SAMPLING METHOD NO. 4.

This method of securing samples for laboratory analysis cover metals, solders, and other similar materials received in the form of ingots, pigs, slabs, rondelles, bars, castings, and scrap.

a. Apparatus. Apparatus will consist of power drill presses using drills of varying diameter, usually five-sixteenths of an inch. And power metals saws or miller; and a Jones or more modern approved sample riffles that divide a sample into two parts by one passing of the material, each part representative of the original material.

b. Gross sample.

(1) The gross sample is best taken during plant production at the time of final forming or casting, and simultaneously with manufacturer's sampling. If this is not possible, then sampling must be done either by sawing, drilling, or milling a representative group of castings or sample specimens, and represent the average cross section of the commodity.

(2) In the sampling of castings or sample specimens, select samples at random from the lot. Considering three ingots as a rectangular unit, drill three holes entirely through the unit, one at the center and one at each end on a diagonal of the rectangle, starting from the bottom. Use no lubricant on the drill. Remove any oil or grease on the sample with either. Start the drill on the surface to remove all oxide and clean the surface before starting to take the sample. Control the drill

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speed to prevent overheating and oxidation of the chips. Collect the drillings for the sample. Discard all drillings carrying oxide from the "set" or burned by the drill. Keep drillings in an airtight bottle.

(3) Pigs and bars of antimony, bismuth, and cadmium may be sampled by selecting at random three pigs or bars from each lot. The gross sample will be obtained by sawing through the sample in sufficient places to obtain representative sawdust for the required laboratory samples. No lubricants may be used for sawing. Saw cuts must be made approximately five-eighths of an inch deep on samples one and one-fourth inches or more wide, and spaced so that metal from the entire sample is adequately represented. Saw cuts approximately five-eighths of an inch deep must be made on a sample one and one-fourth inches wide by eight and one-half inches long as follows: one longitudinal cut on each and approximately five-eighths of an inch from the edge on a bar one and one-fourth inches wide. Transverse cuts must be spaced with marks on one side at two and one-fourth inches, four and one-fourth inches, six and one-fourth inches one end. While the opposite side must be spaced with marks at one and one-fourth inches, three and one-fourth inches, five and one-fourth inches, and seven and one-fourth inches in order that the transverse sawing will not segregate the sample bar into more than one piece. Keep sawings in an airtight bottle.

(4) For certain metals, gross samples must be obtained by the following special procedures:

(a) Nickel - From 5 percent of the electrolytic cathodes of a lot up to a maximum lot size of 50 LT, using template prescribed by ASTM - B39.

(b) Tin - From 10 percent of the pigs of a melt or lot up to a maximum lot size of 50 LT.

(c) Precious metals - Sampling of precious metals must be done in a clean, isolated place, free of dust, grease, or any other contaminating substances. Each lot must be sampled by cutting out a chip on each of a bar, ingot, or plate of the lot, or by sawing three strikes across each of the four corners of a bar or ingot of the lot. Approximately 3 grams must be taken of each lot of material sampled. In sawing, the depth of the cut and speed of cutting must be regulated to prevent excessive heating or oxidation of the sample. Lubricants must not be used in sampling precious metals. In the case of sampling sponge, granules, or powder, the material must be poured from the container and mixed thoroughly. After mixing, the material must be sampled by cutting the flow stream as it is transferred from one container to another. The sample must be thoroughly mixed and divided into a laboratory sample, an umpire sample, and a reserve sample and distributed as required. After the sample has been taken, the lot must be re-weighed and marked with the new weight.

(d) Cobalt in the form of granules or rondelles must be

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sampled by selecting representative portions from 25 percent of the containers in each lot in the same manner as the gross sample. The sample is prepared from the gross by collection in bags or buckets. The accumulated samples from 25 percent of containers in a 100-unit lot will amount to approximately 15 pounds. The total or gross sample taken from one lot must be thoroughly mixed and then riffled down through an approved riffler to an amount that will provide the required number of samples.

c. Laboratory sample. Gross sample of drillings, milling and sawings must be reduced by approved methods for the laboratory sample. The receiving laboratory must sift all sample drillings submitted on a screen with 250 meshes per square centimeter to remove material ground between the drill and sides of the hole, and extract with a strong magnet any iron which may come from the drill.

7-23 SAMPLING METHOD NO. 8.

This method (known as a "Grab Sample") covers sampling in a random manner of a very limited nature to give an indication of the quality of the material.

a. Grab Sample. A grab sample is one taken in a random manner of a very limited nature to give an indication of the quality of the material. A grab sample is not necessarily representative of the material sampled, depending on the homogeneity of the material. Although it is a very limited sample it must be reasonably representative of that portion of the material sampled. Judgment on the part of the sampler is necessary in the taking of the grab sample because the difference in the character of the material sampled will require different techniques. For lumpy material, care must be taken to secure the proper ratio between the larger pieces and fines. In taking a grab sample of material in a pile, the surface must be cleared away to a depth of about 6 inches to avoid surface-altered material and contamination due to pile coverings or wind blown foreign matter. Generally, about three such samples would be taken about one-third of the way up from the toe of the pile and be distributed along the length of the pile. For grab samples of materials in containers, several inches of the surface must be avoided. In grab sampling of finer materials, such as granules or powders, a trier must be used. If a grab sample is to be taken during a continuous loading or unloading operation, the sample may be taken on a less frequent basis than would be necessary for a fully representative sample. The sample of such material may be at one or two intervals, or from one of a number of trucks or rail cars. If a larger quantity of gross sample is taken, it must be reduced by the cone and quarter method or by riffling down to a net sample of 20 to 30 pounds. There are occasions when only a few pounds need to be taken, particularly of packaged material, in this case the whole sample may be submitted.

b. Laboratory Sample. When chemical analyses are to be performed, the sample shall be prepared in accordance with one of the previously listed laboratory sample preparation methods. Use the method that is closest to the type of material sampled.

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PART 5

TABLE OF NATIONAL DEFENSE STOCKPILE COMMODITIES
AND SAMPLING METHODS**7-24 GENERAL.**

This part prescribes sampling methods explained in Part 3 that are generally applicable for the various commodities inspected in the Defense National Stockpile. Different conditions will make it impossible to follow exactly the methods prescribed in these procedures; however, they will serve as guides to the Specialists and samplers in the many conditions where they apply and provide the basis for developing variations whenever necessary.

7-25 TABLES OF COMMODITIES AND SAMPLING METHODS.

Method of Sampling	Commodity	Minimum Amount of Laboratory Sample	Acceptable Containers
1 or 3	Aluminum Oxide	4 oz.	A-B-C-D-E
4	Antimony	4 oz.	A-B-D-E
3	Bauxite	8 oz.	A-B-C-D-E
3	Beryl	16 oz.	A-B-C-D-E
4	Cadmium	10 oz.	A-B-D-E
3	Celestite	8 oz.	A-B-C-D-E
3	Chromite	4 oz.	A-B-C-D-E
3	Cobalt	4 oz.	A-B-D-E
3	Ferroalloys	8 oz.	A-B-C-D-E

Method of Sampling	Commodity	Minimum Amount of Laboratory Sample	Acceptable Containers
3	Fluorspar	8 oz.	A-B-C-D-E
3	Graphite		
	Crucible Grade	2 lbs.	A-B-C-D-E
	Lubricant Grade	1 lb.	A-B-C-D-E
	Amorphous Lump	8 oz.	A-B-C-D-E
2	Iodine	4 oz.	A

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4	Lead		
	Corroding	16 oz.	A-B-D-E
	Others	4 oz.	A-B-D-E
3	Manganese Ore	4 oz.	A-B-C-D-E
5	Mercury	8 oz.	A-B
4	Precious metals	1 gr.	A-B
2	Quebracho	8 oz.	A-B-C-D-E-F
2	Quinidine	1/2 oz.	A
3	Tantalite	4 oz.	A-B-C-D-E
4	Tin	8 oz.	A-B-D-E
3	Titanium	8 oz.	A-B-C
3 or 4	Tungsten	4 oz.	A-B-C-D-E
4	Zinc	6 oz.	A-B-C-D-E
	Special high grade	32 oz.	A-B-D-E
	Other grades	16 oz.	A-B-D-E
3	Zirconium ores	4 oz.	E-F

7-26 EXPLANATION OF TABLE.

a. First column. This column refers to the suitable sampling procedure for each listed commodity, which is determined primarily by the physical character. Sampling methods are described in full in pars. 7-19 through 7-26.

b. Second column. This column is an alphabetical list of the commodities involved.

c. Third column. This column designates the minimum weight of each of the three sample portions finally prepared for laboratory analysis. In cases where the sampler cannot prepare the laboratory sample from the gross sample, consult the applicable sampling method for the amount to be submitted to the laboratory. Special instructions concerning the size of the sample may also be given from time to time.

d. Fourth column.

(1) This column indicates the types of acceptable containers into which the prepared laboratory samples must be placed for shipment and storage. Where only one type of container is permissible, this type has been specified. The symbol in column 4 indicates the following containers:

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- A. Glass.
- B. Plastic containers.
- C. Can with a tight cover.
- D. Cardboard cylinder or carton.
- E. Manila envelope.
- F. Cloth bag.

(2) When containers D, E, and F are used, care must be taken that they are well sealed to prevent loss of portions of the sample. These containers are not suitable for samples for moisture determination. Airtight containers must be used where moisture is to be determined.

(3) Glass containers for samples must be heavy duty, wide mouth jars or bottles of appropriate size, fitted with screw caps of plastic or synthetic resin and chemically resistant liners. Because of the susceptibility to corrosion, metal caps must be avoided. Square jars are preferable to round. These containers must be properly packed to prevent breakage during shipment and marked "Glass - Handle with Care". Glass containers used for such commodities as drugs or iodine must be opaque or dark to prevent deterioration by light.

PART 6

SALES CONTRACT SAMPLING

7-27 SAMPLES FOR PROSPECTIVE BUYERS.

When proper authorization is given usually in the sales solicitation, samples may be either provided by the Specialist or by allowing prospective buyers to draw samples under the direct supervision of the Specialist. For sampling instructions, see Chapter 8.

- a. The solicitation will usually state the quantity of samples that may be taken by the prospective purchaser.

7-28 SALES CONTRACT SAMPLING.

Sales contract sampling is defined as sampling permitted under a Sales contract by an independent sampler/analyst for the purchaser. The Government is not the requester of the sampling or analysis. A business letter document is to be used to transmit any samples taken by the purchasers' sampler. A copy should be given to the sampler and an attached copy included with the DNSC Form 32.

DNSC- _____

Date Sample Sent

Sampler's Name
Title
Company Name

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Street Address
City, State, ZIP

Dear Sir:

This is a record of the sample transmitted as identified below. The Government is not the requester for the sampling or analysis to be performed. This letter is used to verify the receipt of the sample by the purchaser's sampler and provides an address to send a copy of the analysis when required by the Sales Contract.

a. Sample Identification:

Sales Contract Number: _____ Commodity Name: _____
Lot Number: _____ Location of material sampled: _____
Weight of sample taken: _____ Sampling Dates: _____

Sample received by: _____
Sampler's signature

b. _____ If this is checked please forward a copy of the analysis to the address below:

DLA/Defense National Stockpile Center
Stockpile Operations and Logistics
8725 John J. Kingman Road, Suite 3229
Fort Belvoir, VA 22060-6223

The undersigned witnessed the taking of the sample and any field preparation.

Sincerely,

SPECIALIST'S NAME
Depot

Release #
Serial #
Sample #
Total Weight (lbs)
Short Tons

7-29 Sampling in conjunction with weighing.

On material that has been sold the sampling procedures will normally be stated in the sales or sampler/analyst contract and shall be followed. Normally, commercial sampling procedures based on the standards of the American Society for Testing and Materials (**ASTM**) is adhered. On sales, the purchaser will usually be required to obtain an independent sampler/analyst that has been approved by the government. The Specialist will be required to witness all sampling and sample preparation. When the procedures are not stated, the following procedures should be used:

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(a) The minimum quantity of representative sample portions to be taken should be one pound per ton of material. Sampling should be done immediately before or after weighing. In general, the samples are to be taken from the area where the loading units are working, but if impractical, proportionate amounts of samples may be taken from each truck or railroad car.

(b) Samples representative of the material delivered are to be taken daily on a routine and consistent basis for moisture and chemical determinations. A composite analytical sample comprised of representative increments of material from deliveries each day will be made to coincide with each lot, but not more than a weekly interval. The gross analytical samples are to be crushed to appropriate particle size, thoroughly mixed and reduced in quantity by coning and quartering or by the use of sample splitters to arrive at the laboratory samples, including reserve or umpire portions.

(c) All remaining unused gross samples should be returned to the original pile, if taken before weighing is performed. If samples are taken after weighing, rejects from gross sample are to be returned to carrier's conveyances after weighing.

7-30 CONSIDERATIONS FOR SELECTION OF SAMPLES.

Proper selection of samples is an integral part of any successful quality assurance program. Without proper sampling, there can be no confidence in the estimate of lot quality; therefore, the sample is of little or no value. Procedures for proper sampling are described in a through e, below.

a. Homogeneous sampling. Each inspection lot must, as far as practicable, consist of a homogeneous product. Grouping dissimilar products into one inspection lot must be avoided to reduce the likelihood of considerable quality variation in the lot and a wrong inspection decision.

b. Proportional sampling. A proportional number of sample units must be taken from each sublot to form the required sample size. Proportional sampling must also apply to the lots presented for inspection in several containers such as bins, racks, pallets, or boxes.

c. Impartial sampling. Samples must be drawn without regard to their quality. No deliberate efforts must be made to include good or bad units in the sample.

d. Representative sampling. Samples must be drawn from as many parts of the lot as practicable to provide maximum representation of lot quality.

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e. Random sampling. Random sampling provides a proven method for obtaining representative samples. It allows each item in the lot an equal chance of being included in the sample. A simple instruction or haphazard arrangement cannot accomplish effective randomization, it is a deliberate accomplishment and must be planned. Although other methods for obtaining representative samples may be satisfactory, tables of random numbers, a computer generated random numbers system, or the "hat method" is recommended for use, where practicable.

7-31 Responsibility for selection of sample.

The Specialist is responsible for determining which units in the lot must be included in the sample. If possible, the Specialist must personally withdraw samples from a lot. If such withdrawal is too laborious, withdrawal of samples by the contractor under the immediate supervision of the Specialist must be arranged.

7-32 Functions of a sampling plan.

A sampling plan is a device for deciding whether a lot must be accepted or rejected in regard to given characteristics. Basically, a sampling plan contains two things:

- a. How many units to inspect from a lot, i.e., what the sample size must be; and
- b. How good or bad the quality of a sample must be in order to accept or reject the lot, i.e., what the acceptance and rejection number must be.

7-33 Sample size.

The sample size must be as indicated in the applicable specification or purchase document.